

Claims

1. A lithographic projection apparatus comprising:
 - a radiation system to provide a projection beam of primary radiation;
 - 5 a support structure to support patterning structure, the patterning structure constructed and arranged to pattern the projection beam according to a desired pattern;
 - a substrate table to hold a substrate;
 - a projection system to project the patterned beam onto a target portion of the substrate, and
- 10 a radiation sensor disposed in a path traversed by the projection beam, for receiving primary radiation of the projection beam, said sensor further comprising:
 - a radiation-sensitive material that converts incident primary radiation into secondary radiation;
 - a radiation detector adapted to detect said secondary radiation; and
- 15 a filter material on an incident side of the radiation sensitive material and adapted to inhibit secondary radiation from traveling away from the radiation detector.
2. A lithographic projection apparatus according to claim 1, wherein the filter material is transmissive for the primary radiation.
3. A lithographic projection apparatus according to claim 1, wherein the filter material 20 is reflective for the secondary radiation.
4. A lithographic projection apparatus according to claim 2, wherein the filter material is reflective for the secondary radiation.
5. A lithographic projection apparatus according to claim 1, wherein the filter material is in contact with the radiation sensitive material.
- 25 6. A lithographic projection apparatus according to claim 1, wherein said radiation-sensitive material is between the filter material and the radiation detector.

7. A lithographic projection apparatus according to claim 1, wherein said filter material comprises a semi-transmissive metal layer.
8. A lithographic projection apparatus according to claim 7, wherein said metal comprises at least one material selected from the group consisting of Aluminium or
5 Chromium.
9. A lithographic projection apparatus according to claim 1, wherein said primary radiation is of a wavelength of about 150 to about 250 nm.
10. A lithographic projection apparatus according to claim 1, wherein a thickness of said filter material is less than a wavelength of the primary radiation.
- 10 11. A lithographic projection apparatus according to claim 1, wherein said filter layer is of a thickness of 0.5-30 nm.
12. A lithographic projection apparatus according to claim 1, wherein said radiation-sensitive material comprises a layer of a thickness of about 1 to about 50 micron.
13. A lithographic projection apparatus according to claim 1, wherein said radiation-
15 sensitive material is selected from the group consisting of Gd₂O₂S:Tb, Y₂SiO₅:Ce, Y₂SiO₅:Tb, Zn₂SiO₄:Mn, CaS:Ce, YAG:Ce, ZnS:Ag and ZnS:Al.
14. A lithographic projection apparatus according to claim 1, wherein said radiation detector comprises an array of photodiodes, the photodiodes having a pixel size of 5-50 micron.
- 20 15. A lithographic projection apparatus according to claim 1, wherein said filter layer is coated with a passivation layer, said passivation layer comprising at least one of SiO₂, MgF₂, and CaF₂.
16. A lithographic projection apparatus according to claim 1, wherein said radiation sensor comprises an optical element having a spatially varying transmission or phase
25 distribution.

17. A device manufacturing method comprising:
projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate;

using a radiation sensor which is moveable in a path traversed by the projection beam, for receiving primary radiation of the projection beam;
converting incident primary radiation into secondary radiation;
detecting said secondary radiation; and
filtering said secondary radiation such that secondary radiation traveling in a direction away from the radiation detector is attenuated.

10 18. A device manufactured according to the method of claim 17.

19. A lithographic projection apparatus comprising:
a radiation system to provide a projection beam of primary radiation;
a support structure to support patterning structure, the patterning structure constructed and arranged to pattern the projection beam according to a desired pattern;
15 a substrate table to hold a substrate;
a projection system to project the patterned beam onto a target portion of the substrate, and
a radiation sensor disposed in a path traversed by the projection beam, for receiving primary radiation of the projection beam, said sensor further comprising:

20 a radiation-sensitive material that converts incident primary radiation into secondary radiation;
a radiation detector adapted to detect said secondary radiation; and
a filter material on an incident side of the radiation sensitive material and adapted to inhibit secondary radiation from being detected at a position spaced from a general 25 region of initial incidence of the primary radiation.

20. A lithographic projection apparatus comprising:
a radiation system to provide a projection beam of primary radiation;

a support structure to support patterning structure, the patterning structure constructed and arranged to pattern the projection beam according to a desired pattern;

a substrate table to hold a substrate;

a projection system to project the patterned beam onto a target portion of the

5 substrate, and

a radiation sensor disposed in a path traversed by the projection beam, for receiving primary radiation of the projection beam, said sensor further comprising:

a radiation-sensitive material that converts incident primary radiation into secondary radiation;

10 a radiation detector adapted to detect said secondary radiation; and

a filter material on an incident side of the radiation sensitive material that is transmissive for the primary radiation and reflective for the secondary radiation..